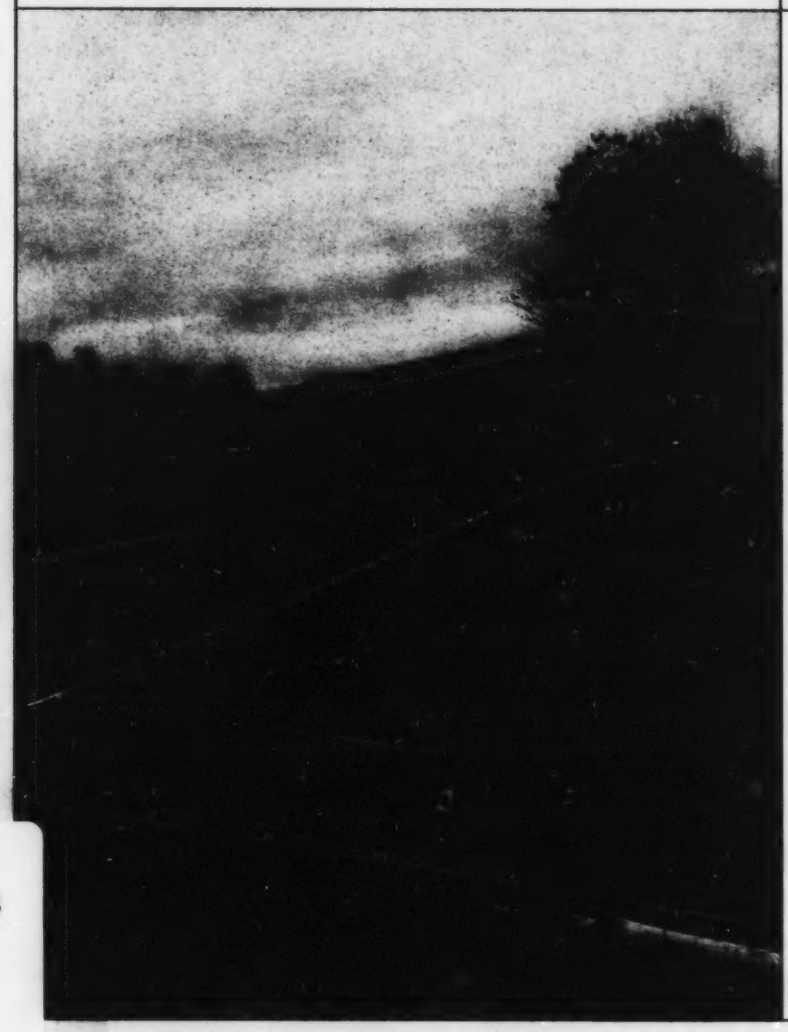
Assessing upland and riparian areas



RANGELAND HEALTH BROCHURE 1

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URL: http://www.for.gov.bc.ca/hfp/range/range.htm

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What is a Watershed?

A watershed is the land drained by a stream or river system and/or associated wetlands and lakes.

A watershed can be as small as a few hectares (e.g., a wetland without external drainage) or as large as thousands of square kilometres (e.g., the Fraser and Columbia rivers).

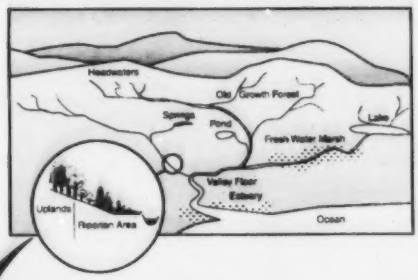


Figure 1 Watershed.

Uplands often comprise more than 99% of the watershed's area, with the floodplain and stream channel making up the rest. Uplands are associated with lowlands through the flow of water, either overland or through the soil. Vegetation slows the flow of water in the uplands so that it infiltrates the soil.

A riparian zone has vegetation that, due to the presence of water, is different from the vegetation of adjacent upland areas. Typically, riparian zones are adjacent to streams or waterbodies, but they also occur adjacent to springs and seeps. Vegetation slows the flow of water on the floodplain, thereby capturing sediment and building banks. A healthy riparian zone acts as a sponge, which slowly releases water to the stream or wetland over the course of the season, thereby maintaining water flow or water levels. A stream in a healthy condition should have ready access to its floodplain during high flow periods.

Good watershed management will result in a good connection between the uplands and the riparian area and between the stream, wetland, or lake and the floodplain or associated riparian area.

The components of a watershed

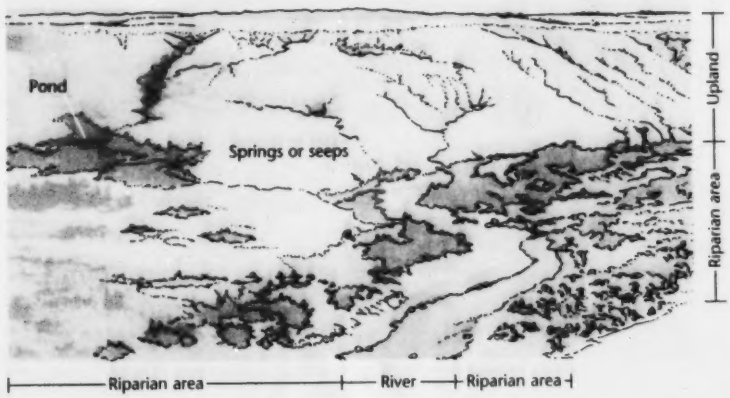


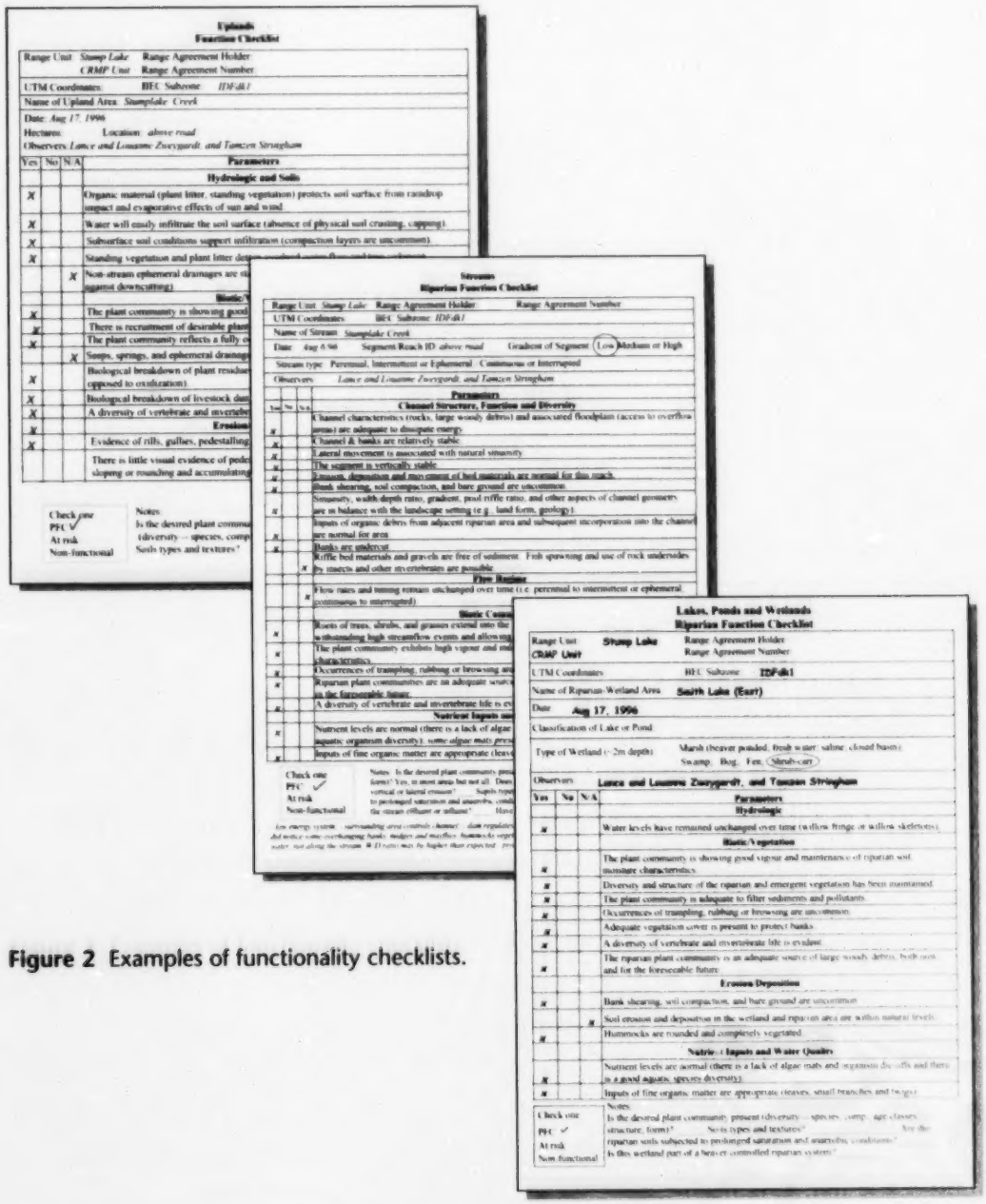
Table 1. Attributes and benefits of a Properly Functioning watershed

Properly Functioning Condition (PNC)	Benefits
Dissipating flood energy	Flood protection
Filtering of sediments and pollutants	Pure water
Stabilizing banks	Lower turbidity
Stabilizing channels	Erosion and flood protection Maintenance of habitats
Storing water	Reliable water supply
Maintaining duration of flow	Reliable water supply
Recharging aquifers (infiltration)	Long-term security of supply
Capturing precipitation	Availability to plants
Building floodplains	Creation of habitats and productive soils
Protecting soil surface from water/wind erosion and the evaporative effects of sun	Stable soil and plant production
Converting solar energy	Plant production

The concept of Properly Functioning Condition has its origin in hydrology and watershed management. A Properly Functioning watershed should capture precipitation where it falls, store it in the soil profile (and move it slowly downslope to the riparian zone), and then slowly and safely release it into streams, rivers, wetlands, and lakes. Several parameters are evaluated in field assessments of the stream or wetland feature, the adjacent riparian area, and the contributing uplands. These are: stream channel or wetland properties, flow regime, hydrology/soils, erosion/deposition, the biotic community, nutrient inputs, and water quality. Areas are rated as "Properly Functioning," "at risk," or "Non-Functional," depending on the observations made.

Functionality checklists for uplands, streams, and wetlands/lakes follow. These are completed for relatively homogeneous areas and provide an objective assessment and record of the health of the riparian feature, its adjacent riparian zone, and the contributing uplands.

Follow-up monitoring is used to determine if management practices on the land are leading to improvement or decline in functionality.



Uplands
Function Checklist

Range Unit: *Stump Lake* Range Agreement Holder
CRMP Unit Range Agreement Number

UTM Coordinates: BEC Subzone: *IDFdk1*

Name of Upland Area: *Stumplake Creek*

Date: *Aug 17, 1996*
Hectares: Location: *above road*
Observers: *Lance and Louanne Zwaygardt, and Tamzen Stringham*

Yes	No	N/A	Parameters
			Hydrologic and Soils
X			Organic material (plant litter, standing vegetation) protects soil surface from raindrop impact and evaporative effects of sun and wind.
X			Water will easily infiltrate the soil surface (absence of physical soil crusting, capping).
X			Subsurface soil conditions support infiltration (compaction layers are uncommon).
X			Standing vegetation and plant litter detain overland water flow and trap sediment.
		X	Non-stream ephemeral drainages are st… against downcutting)
			Biotic V
X			The plant community is showing good …
X			There is recruitment of desirable plant…
X			The plant community reflects a fully e…
		X	Seeps, springs, and ephemeral drainage…
X			Biological breakdown of plant residue… opposed to oxidization)
X			Biological breakdown of livestock dun…
X			A diversity of vertebrate and invertebr…
			Erosion
X			Evidence of rills, gullies, pedestalling…
			There is little visual evidence of pede… sloping or rounding and accumulating…

Check one
PFC ✓
At risk
Non-functional

Notes:
Is the desired plant commu…
(diversity – species, comp…
Soils types and textures?

Stream
Riparian Function Checklist

Range Unit: *Stump Lake* Range Agreement Holder Range Agreement Number
UTM Coordinates: BEC Subzone: *IDFdk1*
Name of Stream: *Stumplake Creek*
Date: *Aug 8 '96* Segment Reach ID: *above road* Gradient of Segment: Low Medium or High
Stream type: Perennial, Intermittent or Ephemeral Continuous or Interrupted
Observers: *Lance and Louanne Zwaygardt, and Tamzen Stringham*

Yes	No	N/A	Parameters
			Channel Structure, Function and Diversity
X			Channel characteristics (rocks, large woody debris) and associated floodplain (access to overflow areas) are adequate to dissipate energy.
X			Channel & banks are relatively stable.
X			Lateral movement is associated with natural sinuosity.
X			The segment is vertically stable.
X			Erosion, deposition and movement of bed materials are normal for this reach.
X			Bank shearing, soil compaction, and bare ground are uncommon.
X			Sinuosity, width depth ratio, gradient, pool riffle ratio, and other aspects of channel geometry are in balance with the landscape setting (e.g. land form, geology).
X			Inputs of organic debris from adjacent riparian area and subsequent incorporation into the channel are normal for area.
X			Banks are undercut.
	X		Riffle bed materials and gravels are free of sediment. Fish spawning and use of rock undersides by insects and other invertebrates are possible.
			Flow Regime
	X		Flow rates and timing remain unchanged over time (i.e. perennial to intermittent or ephemeral, continuous to interrupted)
			Biotic Cond…
X			Roots of trees, shrubs, and grasses extend into the … withstanding high streamflow events and allowing …
X			The plant community exhibits high vigour and … characteristics.
X			Occurrences of trampling, rubbing or browsing are …
X			Riparian plant communities are in adequate … in the foreseeable future.
X			A diversity of vertebrate and invertebrate life is ev…
			Nutrient Inputs an…
X			Nutrient levels are normal (there is a lack of algae … aquatic organism diversity); *some algae mats pres…*
X			Inputs of fine organic matter are appropriate (leav…

Check one
PFC ✓
At risk
Non-functional

Notes: Is the desired plant community pres… forms? Yes, in most areas but not all. Does … vertical or lateral erosion? Soils type… to prolonged saturation and anaerobic cond… the stream effluent or influent? Have…

low energy system…surrounding area controls channel…dam regulates… did notice some overhanging bank…undercut and sheffler…hummocks vege… water…not along the stream. # D tester was by higher than expected…pro…

Lakes, Ponds and Wetlands
Riparian Function Checklist

Range Unit: **Stump Lake** Range Agreement Holder
CRMP Unit Range Agreement Number

UTM Coordinates: BEC Subzone: **IDFdk1**

Name of Riparian Wetland Area: **Smith Lake (East)**

Date: **Aug 17, 1996**

Classification of Lake or Pond:

Type of Wetland (< 2m depth): Marsh (beaver ponded, fresh water, saline, closed basin); Swamp, Bog, Fen, (Shrub-carr)

Observers: **Lance and Louanne Zwaygardt, and Tamzen Stringham**

Yes	No	N/A	Parameters
			Hydrologic
X			Water levels have remained unchanged over time (willow fringe or willow skeletonize).
			Biotic Vegetation
X			The plant community is showing good vigour and maintenance of riparian soil moisture characteristics.
X			Diversity and structure of the riparian and emergent vegetation has been maintained.
X			The plant community is adequate to filter sediments and pollutants.
X			Occurrences of trampling, rubbing or browsing are uncommon.
X			Adequate vegetation cover is present to protect banks.
X			A diversity of vertebrate and invertebrate life is evident.
X			The riparian plant community is an adequate source of large woody debris, both now and for the foreseeable future.
			Erosion Deposition
X			Bank shearing, soil compaction, and bare ground are uncommon.
	X		Soil erosion and deposition in the wetland and riparian area are within natural levels.
X			Hummocks are rounded and completely vegetated.
			Nutrient Inputs and Water Quality
X			Nutrient levels are normal (there is a lack of algae mats and organism diversity and there is a good aquatic species diversity)
X			Inputs of fine organic matter are appropriate (leaves, small branches and twigs)

Check one
PFC ✓
At risk
Non-functional

Notes:
Is the desired plant community present (diversity – species, comp…age classes, structure, form)? Soils types and textures? Are the riparian soils subjected to prolonged saturation and anaerobic conditions?
Is this wetland part of a beaver controlled riparian system?

Figure 2 Examples of functionality checklists.

Potential Natural Community

The Potential Natural Community (PNC) is the plant community that would become established on a range (ecological) site if all successional stages were completed without interferences by humans under today's environmental conditions. The plant community is seen as dynamic, not static.

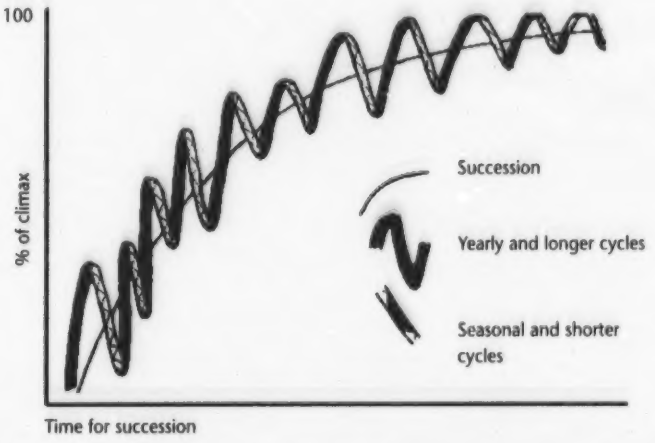


Figure 3 A diagrammatic representation of a plant community changing over time from early seral to a dynamic climax of Potential Natural Community. (Adapted from Heady and Child 1994)

For practical purposes, the Potential Natural Community and the Climax are the same except that the Potential Natural Community recognizes that some irreversible changes have occurred to plant communities due to the influence of humans (weed introductions, climatic change, etc.). In these cases the plant community may be stalled at an earlier seral stage or it may be dominated by an alien or acclimatized species, which would require a major disturbance or input (such as herbicide) in order to proceed to its original potential. The following table compares condition classes and seral stages.

Figure 4 A late seral rough fescue community.

A comparison of range condition class to seral stage

Range Condition Class	% Similarity to the Climax or PNC	Seral Stage
Excellent	75–100	PNC
Good	50–75	Late
Fair	25–50	Mid
Poor	0–25	Early

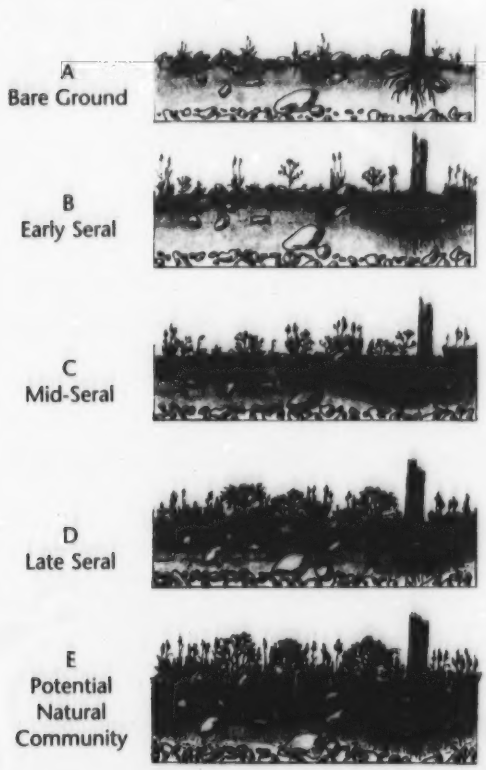


Figure 5 Upland area showing change from bare ground through Potential Natural Community.

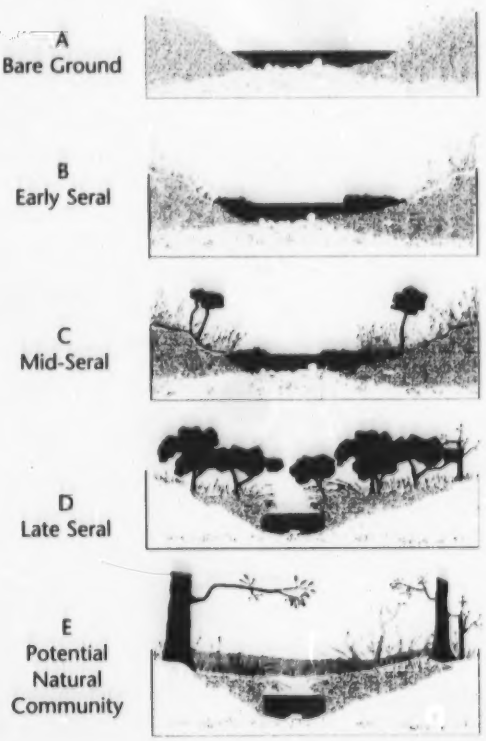


Figure 6 Riparian area showing change from bare ground through Potential Natural Community. (from "Process for Assessing Proper Functioning Condition," Don Prichard, USDITR1737-9-1993)

It is possible to achieve Properly Functioning Condition in the uplands and riparian zones at a seral stage that does not provide the values for which we are required to manage Crown range in British Columbia. This is why the selection of the Desired Plant Community (DPC) is so important.

Desired Plant Community

The Desired Plant Community is one that produces the kind, proportion, and amount of vegetation necessary for meeting or exceeding the land use plan/activity objectives established for the site. The Desired Plant Community must be consistent with the site's capability to produce the desired vegetation through management, land treatment, or a combination of the two.

The Desired Plant Community takes into account multiple values such as: economics, biodiversity, water quality, wildlife, fisheries, livestock forage, recreation, and quality of life. The Desired Plant Community is chosen to optimize for this mix of values, not maximize for any one value, since inevitably some values will be in conflict with others. The Desired Plant Community will, in most cases, be a seral stage to the Potential Natural Community.

There has been a suggestion that Properly Functioning Condition should become the sole means of evaluating rangeland health in British Columbia. However, the Ministry of Forests uses the concept of Properly Functioning Condition in combination with the Desired Plant Community when evaluating the overall health of rangelands.

Properly Functioning Condition is the foundation upon which other values can be achieved. It is a starting point, not the ultimate goal. The joint tools of Properly Functioning Condition and Desired Plant Community provide an effective means of determining whether or not our use of the land is appropriate given the land's capability and the values for which we as a society are required to manage.

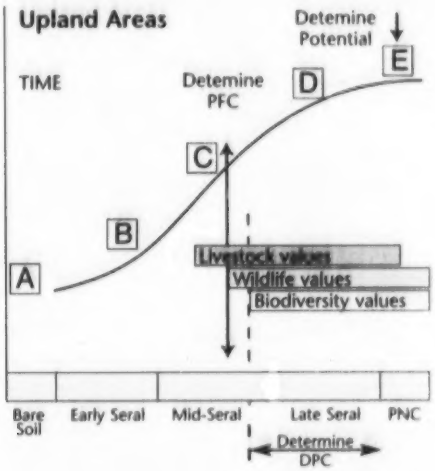


Figure 7 Determining Desired Plant Community in upland areas.

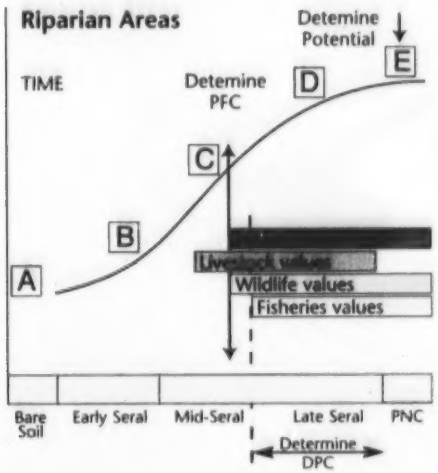


Figure 8 Determining Desired Plant Community in riparian areas.

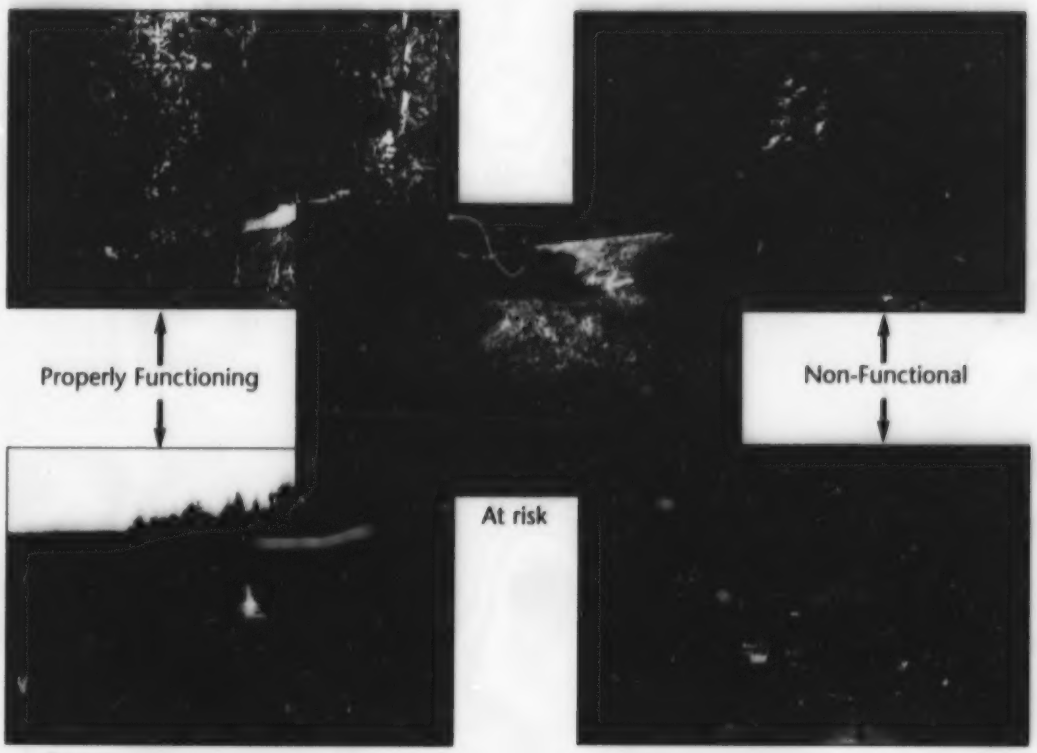
Examples of Varying Stages of Functionality

Riparian or Greenzone

Riparian areas are the lush, well-vegetated areas immediately adjacent to streams, lakes, ponds, and other bodies of water.

A Properly Functioning low-gradient meandering river

Low-gradient Streams



Moderate-gradient Streams

Properly Functioning

At risk

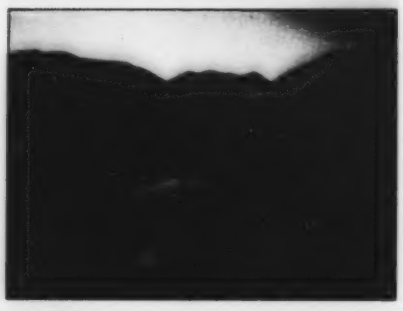
Non-Functional

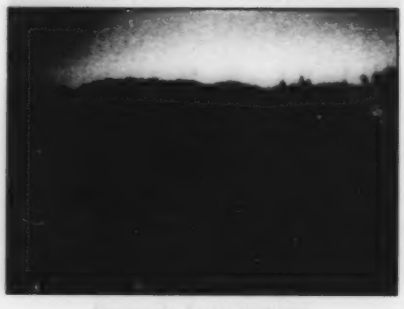
Higher-gradient Streams

Properly Functioning

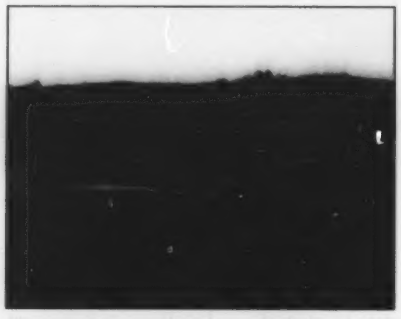
Non-Functional

Wetlands





Properly Functioning



Recovering wetland — slightly at risk

Moderately at risk

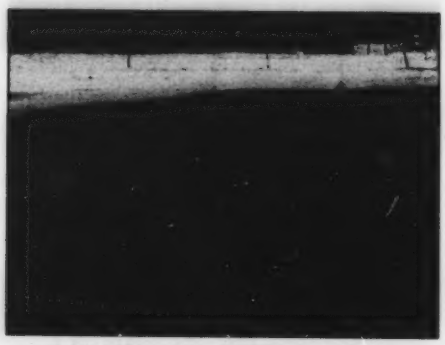
Non-Functional

Riparian Zone

Transition from riparian zone to upland zone

A Properly Functioning sedge-willow riparian area adjacent to a stream

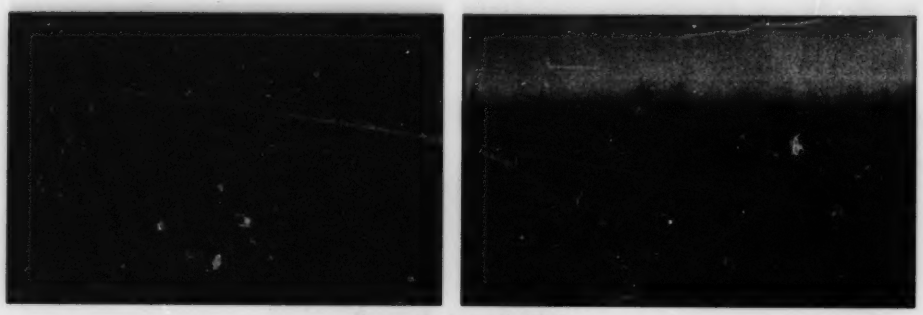
At risk



A Non-Functional stream with an incised channel and no riparian zone

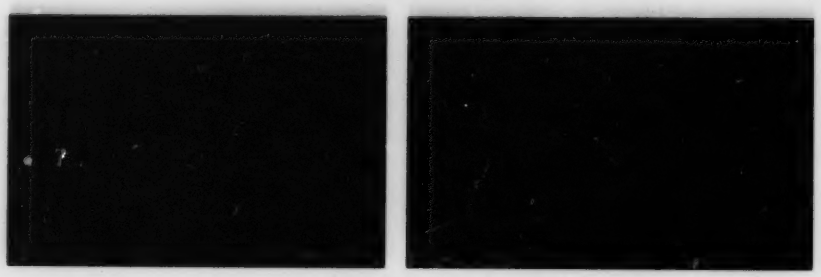
Upland Zone

A healthy upland site



Properly Functioning

At risk



Non-Functional